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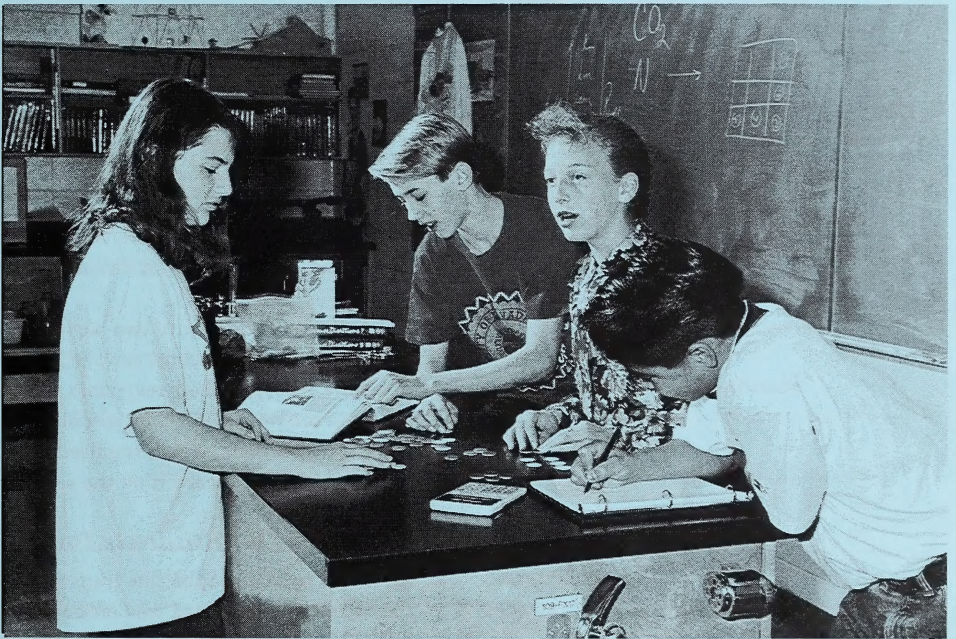
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Assessment Highlights

Grade 9 Mathematics



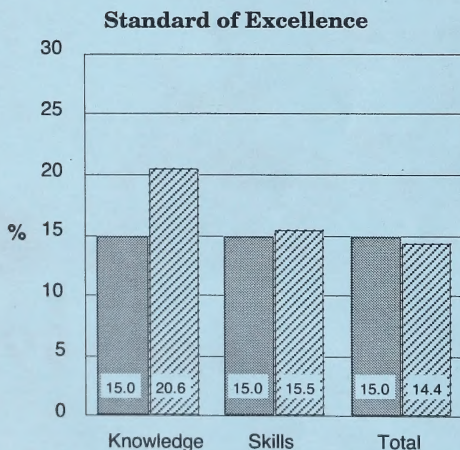
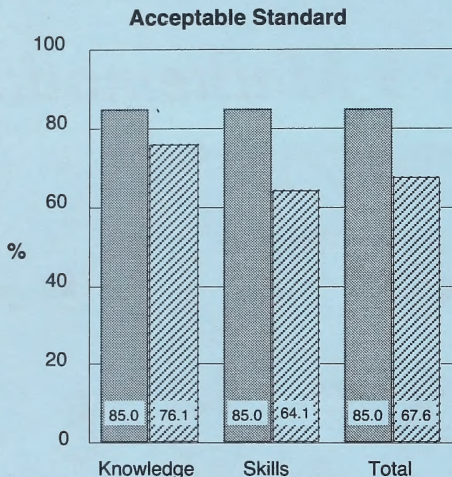
June 1995

Assessment Highlights

Grade 9 Mathematics

This report provides teachers, school administrators, and the public with an overview of the results for the June 1995 Grade 9 Mathematics provincial assessment. It complements the detailed school and jurisdiction reports.

Percentage of Students Meeting:



■ Achievement Standards*
 ▨ Actual Results**

*the percentage of students in the province expected to meet the acceptable standard and the standard of excellence

**the percentage of students in the province who met the standards (based on those who wrote)

Who Wrote the Test?

All students registered in Grade 9 were expected to write the 1995 Mathematics Achievement Test. A total of 34 609 students wrote the test. This number reflects an increase of about 5 200 students over the last administration of the test in 1992. In 1995, only a small proportion of students in Grade 9 did not write the test: 3.9% were absent and 2.6% were excused from writing by their superintendent.

What Was the Test Like?

The test had 50 questions in five content areas: Number Systems and Operations, Ratio and Proportion, Measurement and Geometry, Data Management, and Algebra. The questions were classified in two reporting categories: Knowledge and Skills.

The test was divided into two parts. The first part had 40 multiple-choice questions, each with four alternatives. Students recorded their responses to questions on a separate answer sheet. The second part had 10 numerical-response questions, which required students to calculate the answer and then record it on the separate answer sheet.

How Well Did Students Do?

As shown by the graphs, the number of students meeting the acceptable standard was lower than expected. The difficulties that students have in mathematics is most evident in questions requiring application. Students were more successful with knowledge questions. The number of students meeting the standard of excellence was higher than expected in each component. This is especially noteworthy considering the increase in the number of students completing the test.

In 1.3% of the schools, the percentage of students meeting the acceptable standard was significantly above expectations for the province. In 37.9% of the schools, the percentage of students meeting the acceptable standard was not significantly different from provincial expectations. In 60.7% of schools, the percentage of students meeting the acceptable standard was significantly below provincial expectations. Schools where fewer than five students wrote the Grade 9 test are not included in the calculations.

The results presented in this report are based on scores achieved by all students except those in Francophone programs. Results for Francophone students will be reported separately. Detailed provincial assessment results are provided in school and jurisdiction reports.

Has Achievement Changed Since 1992?

A study of changes in achievement was conducted as part of the provincial assessment. Results indicate that mathematics achievement in 1995 is higher than in 1992.

Test Blueprint

Each question on the test blueprint is classified according to its content area and reporting category. The blueprint shows the distribution of questions according to these classifications.

Strand	Knowledge	Skills	Total Number of Questions
Number Systems and Operations	1, 2, 10, 41	3, 4, 5, 6, 7, 9, 12, 38, 45	13
Ratio and Proportion	11	13, 14, 15, 17, 43, 44, 46	8
Measurement and Geometry	16, 19, 48	18, 20, 21, 22, 23, 24, 47, 49	11
Data Management	25, 27, 28, 29	26, 30, 50	7
Algebra	31, 32, 33, 42	8, 34, 35, 36, 37, 39, 40	11
Total Number of Questions	16	34	50

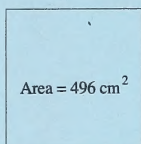
Test Review

The Grade 9 teachers who reviewed and set standards for the assessment felt that it was a good reflection of the mathematics program. Teachers felt that the test emphasizes on understanding concepts and applying them in context, using real-world situations and concrete, pictorial, and symbolic modes of learning, were appropriate.

2. The diameter of a virus is 0.000 009 95 mm. This diameter expressed in scientific notation is

- A. 9.95×10^{-5} mm
 - *B. 9.95×10^{-6} mm
 - C. 9.95×10^{-7} mm
 - D. 9.95×10^{-8} mm
-

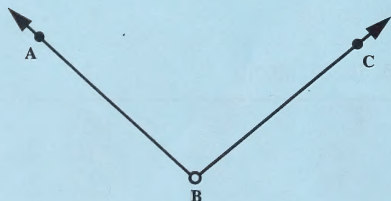
10. The area of a square is 496 cm^2 .



Between which two consecutive integers does the length of each side of the square lie?

- A. 70 cm, 71 cm
 - B. 72 cm, 73 cm
 - C. 23 cm, 24 cm
 - *D. 22 cm, 23 cm
-

Use the information below to answer question 20.



20. The measure of $\angle ABC$ is

- A. 37°
- B. 82°
- *C. 98°
- D. 112°

Observations and Sample Questions

Sample questions from the test and accompanying discussion are provided to highlight the strengths and weaknesses of students meeting the acceptable standard and the standard of excellence. For each sample question, there is an asterisk beside the correct answer.

Acceptable Standard

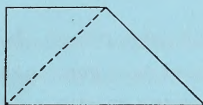
Question 2 required students to convert a decimal expression into scientific notation. Students meeting the acceptable standard can do this.

Question 10 required students to approximate the square root of a number. Of the students meeting the acceptable standard, over 85% can do this.

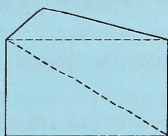
Question 20 required students to measure an obtuse angle using the right-hand scale. Almost 80% of students meeting the acceptable standard can do this.

Use the information below to answer question 7.

For a four-sided polygon, the sum of the interior angles is $2 \times 180^\circ = 360^\circ$.



For a five-sided polygon, the sum of the interior angles is $3 \times 180^\circ = 540^\circ$.



7. Continuing the pattern, what is the sum of the interior angles of a nine-sided polygon?

Solution 1260

Use the information below to answer question 17.

The proportion of gold in jewelry and coins is measured in karats (K), with 24 K representing pure gold.

17. The value of pure gold is \$16.50/g. If a gold bracelet is marked 18 K and its mass is 60 g, what is the value of the gold in the bracelet?

- A. \$278.20
*B. \$742.50
C. \$990.00
D. \$1237.50

Numerical-Response Question 7 required students to develop a pattern to find the sum of the interior angles of a nine-sided figure. About 60% of the students meeting the acceptable standard answered this question correctly.

Overall, results show that students who met the *acceptable standard* were able to solve basic problems involving

- working with number lines
- working with scientific notation (question 2)
- using simple proportion
- estimating (question 10)
- measuring angles (question 20)
- recognizing geometric constructions
- solving exponential equations

These students had difficulty

- using patterns to solve problems (question 7)
- manipulating a formula with two variables
- knowing the meaning of terms such as range, probability, median
- solving inequality conditions
- solving complex problems

Standard of Excellence

The following commentary highlights the skills and knowledge of students who met the *standard of excellence*.

Question 17 required students to find the amount of gold in a bracelet by using a ratio and then calculating the value of the gold. Most of the students achieving the standard of excellence answered this question correctly.

6. A cargo plane can hold 6 trucks and 7 jeeps or 8 trucks and 4 jeeps. If the plane is loaded with jeeps only, then what is the maximum number of jeeps it would likely hold?

Solution 0016

Numerical Response Question 6 required students to determine a strategy to solve a novel problem. Students achieving the standard of excellence had difficulty solving this question.

Students who met the *standard of excellence* demonstrated more success than did other students when answering questions that required applying mathematical concepts in novel or new contexts. Specifically, students meeting this standard could

- use patterns to solve problems (question 17)
- solve place value problems involving divisibility rules
- solve multistep problems

Students meeting this standard had difficulty

- solving problems with two variables (numerical-response question 6)

Comments

Low Results in Mathematics

The low percentage of students meeting the acceptable standard on the Grade 9 Mathematics Achievement Test continues to be a concern. Even with the improvement, results followed a similar pattern to those in 1992.

Standardizing the Numerical-Response Form

An issue regarding the format of answer sheets for numerical-response questions has occurred because some students had difficulty filling in answers for the numerical-response questions on the achievement test. To address this problem, the form that is used for the diploma exams will be used for the 1996 achievement test. This standardizes the form for all achievement tests and diploma exams.

Resolving Administration Anomalies

Although we announced the new practice of reusing items from 1992, 1993, or 1994 tests, and the securing of these tests as late as October 1994, most schools were able to respond quickly and were successful in avoiding the use of these tests with students. Consequently, the 1995 testing was conducted effectively throughout Alberta without compromising the validity of the results. In a few schools, however, questions were raised about students' prior access to the test items and concerns were rightfully expressed about fairness and accuracy. Superintendents were asked to investigate, along with school principals and teachers, these and all other non-standard testing practices brought to our attention and to make recommendations about the validity of the results. Initially 101 student results for Grade 9 mathematics were reported as "not available," pending further investigation due to validity concerns. In the end, results for only 71 students were determined to be invalid for Grade 9 mathematics.

Release of Secured Items

As outlined in the General Information Bulletin, items from the achievement tests are secured except those that are released each year in the subject area bulletins. The items in these bulletins may be used to prepare students for the provincial assessment. The subject area bulletins are mailed to all schools in the fall.

Parent Guide to Provincial Achievement Testing

Last spring, we sent to schools copies of the *Parent Guide to Provincial Achievement Testing* to distribute to parents through the students in grades 3, 6, and 9. The purpose was to support open communication about provincial standards and the testing program among the teacher, the student, and the parent. The guide included a tear-out card with several questions and space for comments. Parents returned over 2000 cards; about half included comments. Parents' feedback about the learnings expected of students, the quality of questions on the tests, and the testing program was generally positive. Their written comments ranged from positive to negative, and many simply asked for more information. As parents seemed to appreciate this form of communication, we are looking for a way to make the guide available again later this school year.

Performance-Based Assessment

In addition to writing the achievement tests, a random sample of students from across the province participated in a performance-based assessment in **Language Arts 3, Mathematics 6, and Social Studies 9** in 1995.

Performance-based assessment reports will be sent to participating schools. A "Samples of Student Responses" document for the performance-based assessment will be prepared and made available to all schools in the spring of 1996.

1995 Administration—A Note of Thanks

We at Student Evaluation wish to express our appreciation to you, the principals and teachers throughout Alberta, for the care and attention you gave to the administration of the 1995 achievement tests. Successful implementation of the expanded program and the changes in procedures and rules depended on your assistance and cooperation. We hope that you find the changes in the testing and the additional achievement information helpful in your work with students.

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For further information, contact Kathleen Melville, Assessment Specialist, or Dennis Belyk, Assistant Director, at 403-427-0010. The toll-free number is 310-0000.



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